

*Stated Meeting, April 17.*

Present, twenty-nine members.

MR. DU PONCEAU, President, in the Chair.

The following donations were received.

## FOR THE LIBRARY.

Sundry Chinese Works, consisting of 29 volumes, or pamphlets, 8vo.

*From the Rev. Mr. Gutzlaff, Missionary at Canton.*

Flora Batava, of Afbeelding en Beschryving van Nederlandsche Gewassen, door Jan Kops, Hoogleraar te Utrecht; en F. A. W.

Miquel. 118 aflevering, 4to. Te Amsterdam, 1839.—*From His Majesty the King of the Netherlands.*

Bulletin de la Société de Géographie, Deuxième Serie. Tom. 11ème. 8vo. Paris, 1839.—*From the Society of Geography of Paris.*

Charles d'Este, ou Trente Ans de la Vie d'un Souverain. 2 Tom. Paris, 1836.—*From Mr. Du Ponceau.*

Considerations on the Principal Events of the French Revolution, Posthumous Work of the Baroness de Stael. Edited by the Duke de Broglie, and the Baron de Stael. 8vo. 2 vols. New York, 1818.—*From the same.*

The History of the Origin, Progress, and Termination of the American War. By C. Stedman, who served under Sir W. Howe, Sir H. Clinton, and the Marquis Cornwallis. 2 vols. 4to. London, 1794.—*From Mr. Vaughan.*

The American Journal of Science and Arts. Conducted by Benjamin Silliman, M.D., LL.D., aided by Benjamin Silliman, Jr., A. B., &c. &c. Vol. XXXVIII. No. 2. April, 1840.—*From the Editors.*

Annales des Mines, ou Recueil de Mémoires sur l'Exploitation des Mines, &c. &c. rédigées par les Ingénieurs des Mines, &c. &c. Tom. XVI. 5<sup>e</sup> Livraison de 1839. 8vo. Paris, 1839.—*From the Ingénieurs des Mines.*

Catalogue of the Library of the late Dr. Thomas Cooper. 8vo. Columbia, 1839.—*From Dr. Hays.*

A Report on the History and Causes of the Strangers', or Yellow Fever of Charleston, read before the Board of Health. By

Thomas Y. Simons, M. D., Chairman of the Board.—*From the same.*

The Committee, consisting of Professor Bache, Dr. Patterson, and Mr. Walker, to whom was referred a paper entitled "On the Storm which was experienced throughout the United States, about the 20th of December, 1836, by Elias Loomis, Professor of Mathematics and Natural Philosophy in Western Reserve College," reported in favour of publication in the Society's Transactions, which was ordered accordingly.

The memoir of Prof. Loomis first describes the sources of information to which he has had access, consisting of various published or private meteorological journals. The principal phenomena occurred in the eastern states, within the period recommended by Sir John Herschell for hourly meteorological observations; and were, of course, accurately noted at the stations where these observations were made. From various sources, Prof. Loomis has obtained observations of the barometer at twenty-seven different stations in the United States and the neighbouring British possessions, and records of the thermometer and weather from twenty-eight military stations of the United States, from forty-two academies of the state of New York, and from five other stations within the probable limits of the storm, besides others beyond it. In some cases two sets of observations were made at the same station.

The phenomena are discussed by the author under the following heads. 1. A remarkable oscillation of the barometer. 2. A sudden depression of the thermometer. 3. The amount, and the time of beginning and ending of the rain. 4. The direction and velocity of the wind.

1. The observations of the barometer show that during the storm there was a sudden depression of the barometer immediately succeeded by a sudden rise; that the minimum of pressure occurred first in the western states, and passed in a wave over the United States, moving eastwardly. The curves drawn to represent the heights of the barometer illustrate this fact in a very striking manner. Prof. Loomis has attempted to determine, from the observations, the amount of depression of the barometer, the form and velocity of the atmospheric wave, the progress of which, over the United States, he has represented upon a chart.

2. A comparison of the observations of the thermometer and barometer, shows that while the pressure was diminishing the temperature was increasing, and vice versa. The very remarkable diminution of temperature of  $48^{\circ}$  Fah. in six hours and a half, occurred at one station in the N. W. of the United States. The commencement of the diminution of temperature is shown to coincide with the minimum of the barometer, and hence is used when barometric observations were not made, to point out the probable time of the occurrence of this minimum. The average of the maxima of the thermometer at the eastern stations was about  $3\frac{1}{2}^{\circ}$  Fah. greater than at the western, and the average of the minima  $14^{\circ}$  Fah. greater.

3. Rain or snow fell during the storm within the limits of about latitude  $28^{\circ}$  N. to latitude  $48^{\circ}$  N., and from longitude  $52^{\circ}$  to  $96^{\circ}$  W. The average amount at fifty-nine stations was seven-eighths of an inch. The author is led to remark upon the great discrepancies in the statements of the fall of rain at places very near each other, and upon defects in the registers in not stating the time of beginning and ending of the rain.

4. The epoch of the minimum of pressure at the several places of observation was marked by a change of wind from a southern quarter, generally the south-east, to a northern quarter, almost uniformly the north-west. This sudden change of wind was every where one of the most prominent features of the storm, the wind having been violent both before and after the change; but more violent from the north-westerly direction, except perhaps at New York and in the north-eastern states.

The author sums up thus the characteristic of the storm. After a cold and clear interval, with the barometer high, the wind commenced blowing from a southerly quarter; the barometer fell rapidly, the thermometer rose, and rain fell in abundance. The wind subsequently veered suddenly to the north-west, and blew with great violence; the rain was succeeded by hail or snow, which continued but for a short time. The changes thus described occurred, not simultaneously, over the United States, but progressively from west to east.

The author next endeavours to determine the limits of the storm, using for this purpose other meteorological registers in addition to those before noticed, and of which he gives a particular account. From these, and theoretical considerations, he places the Rocky Mountains as the western limit, the parallel of  $25^{\circ}$  N. lat. as the southern limit, the middle of the Atlantic as the eastern limit, and the northern

as altogether conjectural, but probably as remote as the arctic circle, thus extending over  $70^{\circ}$  of longitude and  $40^{\circ}$  of latitude. The question whether the remarkable storm which occurred in Europe, about the 25th of December, was a continuation of this storm, is examined, and the author concludes, from a discussion of its peculiarities, that it was not—the progress of the barometric minimum in Europe being from north to south, inclining a little to the west.

The author next proceeds to generalize the deductions in regard to the circumstances of this storm, and to apply them as tests to the different theories of wind, rain, &c.

He first endeavours to show how far registered observations of the wind may be influenced by localities, and their accuracy affected by the mode of observing, and the transcribing of the registers; and concludes that it is indispensable to regard the average of directions at near stations, and not those at individual ones, and gives some examples of discrepancies at places near each other, in support of this opinion. The anomalies presented by the stations in the state of New York are very curious.

The causes assigned by theory for the production of winds are next enumerated and discussed. Recurring to the observations, the author traces a connexion between the direction of the surface wind on the 18th and 19th of December, and a maximum of the barometer existing on a line nearly north and south, moving eastwardly, and passing, on the morning of the 20th of December, nearly through the eastern extremity of the State of Maine. At this period a minimum of the barometer existed nearly on the line of the river Mississippi, and the winds blew towards this line. This minimum is traced in its motion eastward; and in connexion with it, the change of wind from the easterly to the westerly quarter. On the afternoon of the 21st, the line of minimum pressure had reached Boston; and on the 22d, the north-westerly wind now prevailed at nearly all the stations. The direction and approximate force of the wind, on the morning of the 21st, are represented upon a map of the United States, accompanying the memoir. From an examination of a phenomenon of the wind, Prof. Loomis concludes that the south-easterly current rose, so that the north-westerly wind thus became the lowermost current; and subsequently, from an examination of the phenomenon of the rain, snow, and hail, that the rising current was, in part at least, deflected back upon itself. The immediate cause of the south-easterly wind is

traced to the existence of a minimum of pressure, at some point north of the United States.

The author next examines the various causes which have been, or may be, in his opinion, assigned as producing rain, and infers that the most common cause of rain, in these latitudes, is the sudden lifting up of warm air into regions about the earth's surface, by its displacement by a cold current originally above it, and from an opposite direction; and that such was the actual cause of the rain in question, a warm current from the south having been displaced, and caused to rise to a considerable elevation by a cold current from the west. The mixture of the warm and cold air is inadequate, in the author's opinion, to account for the phenomena.

The author then explains the causes of the observed rise of the thermometer to be due to the warm south-east wind, and the subsequent depression to the cold north-west wind.

The author next examines the causes which have been assigned for the fluctuations of the barometer during this storm, selecting, as applicable to the present case, the following:—"The south-east wind, which accompanied the rain, moved with an accelerated velocity. The particles, therefore, of air, at one extremity of the current, must have left those of the other extremity at an increased distance. Hence a mechanical rarefaction, and, of course, diminished pressure. The reverse effect must have taken place after the storm had passed. A north-west wind sets in with great violence. A vast body of air is precipitated toward the south-east. The partial vacuum which at first existed, is very soon supplied: yet, though the first impelling cause has ceased to act, the momentum of the excited current still urges it onward, and a condensation results, which continues the rise of the barometer."

The author concludes by remarking, that he has availed himself in these discussions of the suggestions of writers on meteorology, and is especially indebted to the labours of Messrs. Redfield, Espy, and Reid.

Dr. Hare read a communication entitled "Engraving and description of an apparatus and process for the rapid congelation of water, by the explosive evolution of ethereal vapour, consequent to the combined influence of rarefaction and the absorbing power of sulphuric acid, by Robert Hare, M. D.," which was referred to a Committee.



Mr. Walker read a communication, entitled "Observations on Nebulæ with a fourteen feet Reflector, by H. L. Smith and E. P. Mason, during the year 1839, by E. P. Mason," which was referred to a Committee.

Dr. Hare made a verbal communication in reference to the extent at which the galvanic influence could be extended through a coil of wire.

Dr. Hare stated, that he had prepared a coil of copper wire, No. 26, nearly a mile in length, by means of which, and a strap of copper, three inches in width, and 196 feet in length, he had been enabled to repeat the experiment of Professor Henry, for exciting a Faradian current. The wire was covered with cotton, and was coiled upon a wooden sieve hoop. Being suspended over a pulley, and counter-balanced by a weight over the strap, when this was placed in the circuit of a calorimotor, so that the circuit might be broken by drawing one of the electrodes over a rasp or ratchet wheel, communicating with the coil, shocks were felt, when the distance of several feet intervened, and they became intolerable when the coil and strap were nearly in contact. Having this coil at command, it occurred to Dr. Hare, to ascertain how far it would be competent to act as a multiplier. It seemed to be a problem which was yet to be solved, how far the extension of the length of the coils employed would affect their efficacy. He had not heard of any one in which resort had been had to an extension so great as a mile. Actuated by these considerations, Dr. Hare supported his coil in a vertical plane, and placed upon the lower and under surface of the hoop, the magnetic needle of an ordinary multiplier. A five cent piece, and a disk of zinc of the same size, being separated by a piece of moistened paper, when one of the ends of the coil was made to touch the silver disk and the other the zinc, the needle moved nearly a quadrant at every contact. When the disk was divided into four parts, every one of them was adequate to produce a movement in the needle, when the coil was made the medium of discharge. That such minute portions of metal should be capable of creating an electrical current in so long a coil, and sufficiently copious to influence a magnetic needle, would have appeared incredible to him, had it not been thus proved experimentally.

Dr. Hare stated the general results of some experiments,

made since the last meeting of the Society, on the rarefaction of moist and dry air.

Prof. Bache presented a chart of the magnetic observations made on the 28th of February last, in which he was assisted by Mr. Walker and Mr. Kendall. He farther called the attention of the Society to the recent publication of Prof. Gauss, in regard to the simultaneous changes of magnetic intensity at places as far apart as Göttingen and Munich.

Dr. Dunglison read a letter from the Rev. James T. Dickinson, of Singapore, to Mr. Du Ponceau, dated Nov. 25, 1839, expressing his satisfaction with the views of Mr. Du Ponceau, as contained in his "Dissertation on the Chinese System of Writing."

When Mr. Dickinson commenced the study of the Chinese language, nearly four years ago, he attempted to learn the written language by the eye merely, without connecting sounds with the characters. To this course he was led by the fact, that the Hok-kien dialect, the one he studies, differs very much, as *spoken*, from the sounds given to the characters as *read*. His plan was to learn the colloquial language by itself, and to defer the learning of the sounds given to the characters in reading, while, in the meantime, he endeavoured to learn to read the characters independently of all sounds. In this way he would have succeeded in learning to read Chinese books, had the common hypothesis, that the Chinese characters are addressed *directly* to the mind, and not to the mind through the medium of sounds, been correct. Mr. Dickinson, however, found himself always translating either into English or the colloquial Chinese. All his efforts to transfer the ideas represented in Chinese books to his own mind, without the help of words, either Chinese or English, were fruitless.

Mr. Dickinson considers the work of Mr. Du Ponceau "a most valuable gift to the world, and an honour to American learning."

Dr. Dunglison referred to a curious but not unique case, of a worm in the eye of a horse now in Baltimore.

The particulars were contained in a letter to him, from Dr. Joshua J. Cohen, of Baltimore. This entozoon is a species of filaria, (see *Filaria Papillosa*, Rudolphi, Synops. p. 213) probably from  $3\frac{1}{2}$  to 4 inches

in length, and situate in the aqueous humour, in which it moves about with great activity, but its motions are so constant, that it is difficult to appreciate its exact length. The great size of the anterior chamber of the horse's eye, affords it ample space; and through the transparent cornea, it can be observed as well as if it were in a glass vessel. The horse was sent up from Calvert county, Maryland.

Dr. Dunglison made some observations on the difficulty of accounting for its presence in this shut sack, and alluded to the different views of distinguished naturalists as to the generation of many of the lower tribes of the animal kingdom,—some presuming that they may be formed spontaneously, whilst others consider that the germs must always be received from without. The difficulty, he observed, applied to all the entozoa that infest the animal body; and this case was certainly not more difficult of explanation, than that of entozoa found in the intestines of the fœtus in utero.

Dr. Bache referred to a similar case, which was published in an early volume of the Transactions of the Society, (Vol. II. p. 183, by F. Hopkinson, Esq., and Ibid. p. 383, by Dr. Morgan.)

Mr. Walker referred to a letter which he had received from Prof. Loomis, containing two observations of Galle's second comet, and stated, that he (Mr. Walker) had been engaged in deducing the elements of the orbit of the comet, which accorded with results of European observers, but did not perfectly correspond with those of Prof. Loomis.

The following gentlemen were duly elected members of the Society:—

PAUL BECK GODDARD, M. D., of Philadelphia.

W. H. C. BARTLETT, Professor of Natural and Experimental Philosophy, West Point.

WM. R. FISHER, M. D., of Philadelphia.

GEORGE M. WHARTON, of Philadelphia.

FRIEDR. WILHELM BESSEL, Director of the Observatory, Königsberg.

Rev. WM. H. FURNESS, of Philadelphia.

Captain FRANCIS BEAUFORT, R. N., Hydrographer to the Admiralty of Great Britain.

HARTMAN KUHN, of Philadelphia.

GEORGE WASHINGTON SMITH, of Philadelphia.